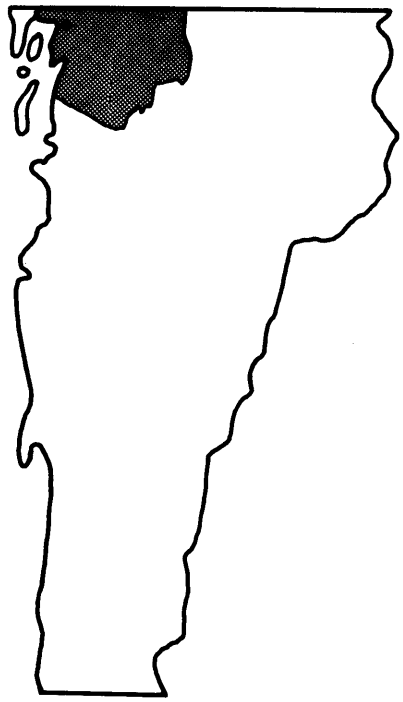
FLOOD INSURANCE STUDY

☒ 500220
TOWN OF SWANTON, VERMONT
FRANKLIN COUNTY
OCTOBER 18, 1982

☐ 500060
VILLAGE OF SWANTON, VERMONT
FRANKLIN COUNTY
SEPTEMBER 16, 1982



Federal Emergency Management Agency

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Flood Insurance Rate Map

FLOOD INSURANCE STUDY
TOWN AND VILLAGE OF SWANTON, VERMONT

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Town and Village of Swanton, Franklin County, Vermont, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert the Town and Village of Swanton to the regular program of flood insurance by the Federal Emergency Management Agency (FEMA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these federally-supported studies are based. These criteria take precedence over the minimum federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.3. In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by Dufresne-Henry Engineering Corporation for the Federal Emergency Management Agency, under Contract No. H-4751. This work was completed in January 1981.

1.3 Coordination

On April 12, 1978, flooding sources requiring detailed and approximate study were determined at an initial Consultation and Coordination Officer's (CCO) meeting attended by representatives of the FEMA, community officials, local and regional planners, and Dufresne-Henry Engineering Corporation (the study contractor). An anncuncement stating the beginning of the study appeared in the County Courier on September 21, 1978.

The Vermont Department of Water Resources and the Franklin County Regional Planning and Development Commission were notified of the study and requested to supply information from published and unpublished Flood Insurance Studies, flood plain regulations, and floodway requirements. The Vermont Department of Highways was contacted to obtain any available topographic maps of the area. The U. S. Geological Survey (USGS) was contacted to obtain flood-prone area maps covering the study area. The community was requested to submit data concerning flood hazards, historical floods, plans to avoid potential flood hazards, and other appropriate data. The study contractor made periodic contacts with local officials to keep them informed on the progress of the study and to solicit pertinent information.

Interviews were conducted with local residents to obtain high-water data at sites where ice jams are known to occur. Their estimates of high water due to ice jams were field surveyed, and the results were utilized to validate portions of the hydrologic and hydraulic analyses.

On May 3, 1982, the results of the study were reviewed at a final CCO meeting held with representatives of the FEMA, the Town and Village of Swanton, and the study contractor.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Town and Village of Swanton, Franklin County, Vermont. The area of study is shown on the Vicinity Map (Figure 1).

The Missisquoi River from the downstream corporate limits to the Missisquoi National Wildlife Refuge and the Lake Champlain shoreline within the Town of Swanton were studied by detailed methods. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction for the next five years, through January 1986.

Charcoal Brook, Hungerford Brook, and Dead Creek were studied by approximate methods. Approximate methods of analysis were used to study those areas having low development potential and minimal flood hazards as identified at the initiation of the study. The scope and methods of study were proposed to and agreed upon by the FEMA.

2.2 Community Description

The Town and Village of Swanton are located in the western portion of Franklin County in northwestern Vermont. The village is completely surrounded by the town. The town is bordered by Lake Champlain to the

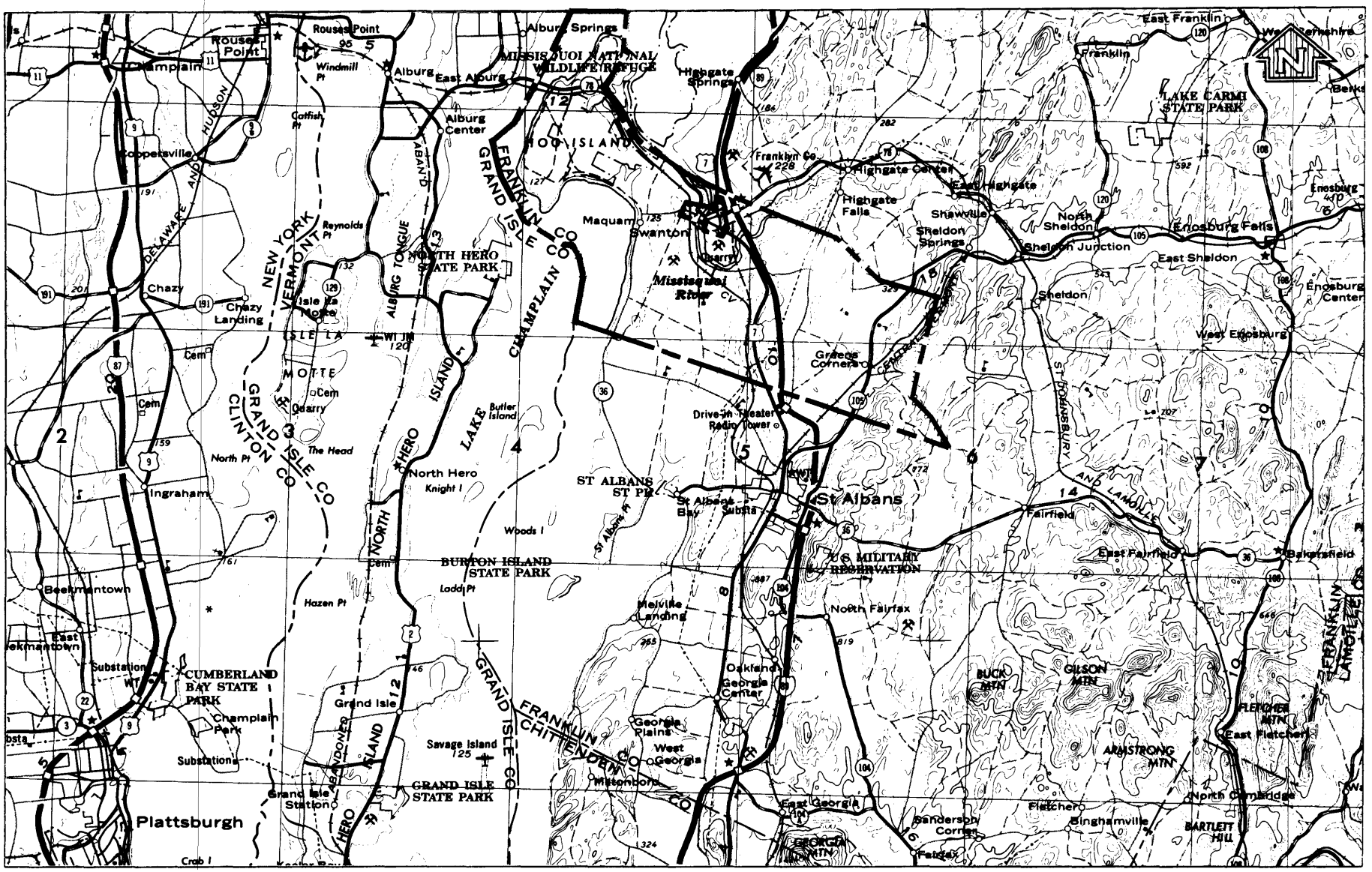


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN AND VILLAGE OF SWANTON, VT
(FRANKLIN CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

west, the Town of Highgate to the north, the Town of Sheldon to the east, the Town of Fairfield to the southeast, and the Town of St. Albans to the south.

The topography of the study area is characterized by gently rolling hills and generally steep river banks that are bordered by wide flood plains. There are several stream reaches contained within narrow, steep sided gorges.

The flood plain of the Missisquoi River near Lake Champlain is primarily an area of marsh and woodland, with some portions being used for farming. Residential areas in the town are located along the road system, extending southeast of the Village of Swanton toward St. Albans and along Maquam Road and the Lake Champlain shoreline. The only significant development in the study area is in the Village of Swanton, and it is located above the flood plain.

The estimated 1975 population of the study area was 4,803, an estimated 4-percent increase over the 1970 figure. This figure was slightly below the average growth rate for Franklin County during the same period of time.

2.3 Principal Flood Problems

Transportation facilities that parellel the river are subject to periodic flooding, such as the Central Vermont Railway which has tracks crossing the flood plain. There is one section of U. S. Route 7 and several sections of State Route 78 that parellel the Missisquoi River and are subject to flooding. Small areas of undeveloped farmland in the Town and Village of Swanton are subject to flooding by localized flooding sources.

Public utilities, such as water mains, electric lines and bridge crossings, are also subject to destruction by floodwaters. There are a few buildings located near the Swanton Village Dam that are subject to flooding.

Since most of the drainage area of the Missisquoi River (approximately 96 percent) lies above the study area, flooding within the study area is affected by the intensity and duration of rainfall in areas further upstream. In addition to floods caused by rainfall, the area is subject to floods caused by rainfall mixed with snowmelt and ice jams, or a combination of the three.

Flooding on the Missisquoi River within the boundaries of the Missisquoi National Wildlife Refuge is controlled by the floodwaters of Lake Champlain. Since this area consists primarily of swamps, water levels do not rise rapidly, but disperse into a wide flood plain.

The flood of November 3 and 4, 1927, was the only major flood in this portion of the Missisquoi River to cause any notable damage to property. The storm brought a total of 6.35 inches of rainfall to the Village of Enosburg Falls, Vermont, which lies within the Missisquoi River basin (Reference 1). The wet antecedent conditions, combined with a partially frozen water surface and intense rainfall, resulted in severe flooding. Figures 2 and 3 show flood damage from the November 1927 flood at two locations within the study area.

Figure 2 - An upstream view of flood damage along the Missisquoi River at the Swanton Village Bridge on November 4, 1927.

Approximately 2.5 miles of the valley was flooded to a depth of 10 to 15 feet, and the approaches to two bridges were scoured. The Swanton Village Dam had 15 feet of water over the crest, and on the west side, several houses were undermined due to the scouring effect of the flooding on the bank. The water levels also reached the floor of the steel highway bridge (Reference 1).

The citizens of the Town and Village of Swanton took measures which stopped an onslaught of water that threatened to wash out the approach to the bridge at the falls, which was the only route between St. Albans and the Town of Swanton (Reference 2). The old sawmill at the falls was swept down the Missisquoi River, and the penstock at the Swanton Village Power Plant was so badly damaged that power had to be supplied from the Remington Plant at the Town of Swanton (Reference 2).

Figure 3 - Flood damage from the November 1927 flood at Johns Bridge on Swanton - St. Albans Road (U. S. Route 7), over the Missisquoi River.

Chevlier's Hardware Store and Lapell's Grist Mill and Storage Room were washed out by the flood, and Webster's Planing and Sawmill was also badly damaged by water.

In addition to free-flowing events, there is documented history of ice jams in the study area. The impact of ice jams is felt primarily from the Missisquoi National Wildlife Refuge headquarters to the base of Swanton Village Dam, and from the U. S. Route 7 bridge to the upstream corporate limits.

From interviews with local residents, it was determined that the flood elevations of the March 6, 1979, ice jam event were approximately equal to those of the 1927 flood from the Missisquoi National Wildlife Refuge headquarters to the base of the Swanton Village Dam. However, the energy imparted by the 1927 free-flowing flood event was far more destructive

than the backwater and ice shoving damage created by the 1979 ice jam. Newspaper articles and local residents have documented ice jam occurrences almost every year. A combination of interviews with local residents and field surveys indicate that flood elevations resulting from a 10-year ice jam approximated flood elevations resulting from a 100-year free-flowing flood. Although ice jams create more frequent floods and generally result in higher flood elevations, their effects in terms of damage and losses are quite different from free-flowing floods.

During an ice jam, enormous blocks of ice (ice floes) have been known to cover properties in the flood plain. Figure 4 depicts ice floes on the property of Louis Young (approximately 1,500 feet above the National Wildlife Refuge boundary). The figure shows that the jam has broken and floodwaters have receded.

Figure 4 - Ice blocks on the Louis Young property during the March 6, 1979, ice jam.

Figure 5 depicts water levels during the recession of the 1979 ice jam, approximately 500 feet upstream of the Louis Young house.

2.4 Flood Protection Measures

The only dam located within the study area is the Swanton Village Dam, which is used for electric power generation and has no significant flood control capacity. It does, however, act to control the occurrence of ice jams upstream of the dam. No other flood control structures exist or are authorized for construction in the study area.

Figure 5 - Flooding during 1979 ice jam on State Route 78 approximately 2,000 feet above the National Wildlife Refuge boundary.

The Town and Village of Swanton have enacted zoning regulations which prohibit the construction of any structure for human habitation, and also prohibit pumping and landfilling within areas that are subject to periodic flooding. These areas may be used for agricultural purposes and for recreational facilities, such as parks and golf courses.

The National Weather Service Office (NWSO) in the City of Burlington, Vermont, maintains year-round surveillance of weather conditions for the area of the Missisquoi River watershed. It has also established a flood warning system for all Vermont communities that are subject to flooding. This system is a communication network of 12 localities as selected by the NWSO, the Vermont Civil Defense Office, and the National Alarm Warning System, which warns the various communities of flood hazards.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, or

500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one-percent chance of annual occurrence) in any 50-year period is about 40 percent (four in ten) and, for any 90-year period, the risk increases to about 60 percent (six in ten). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for the Missisquoi River and peak elevation-frequency relationships for floods of the selected recurrence intervals for Lake Champlain.

Hydrologic analyses were based on records of the USGS gaging station (No. 2935) on the Missisquoi River near Richford, Vermont. A statistical analysis of the stage-discharge data from 1911 to 1923 and 1928 to 1978 was used to obtain values for the 10-, 50-, 100-, and 500-year flood discharges (Reference 3). These values were checked against regional discharge-drainage area relationships which yielded comparable results. The developed discharges for the drainage area above Richford were applied to the larger downstream watersheds by using a drainage area-discharge ratio formula:

$$Q_1/Q_2 = (A_1/A_2)^n$$

where Q_1 and Q_2 are the discharges at specific locations and A_1 and A_2 are the drainage areas at these locations, with the exponent varying from 0.70 to 0.80 for the New England area. An average value of 0.75 was used for the formula (Reference 4).

A summary of drainage area-peak discharge relationships for the Missisquoi River is shown in Table 1, "Summary of Free-Flowing Discharges".

TABLE 1 - SUMMARY OF FREE-FLOWING DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
MISSISQUOI RIVER					
At Lake Street in the Village of Swanton	851	22,300	30,100	33,800	43,600
At the confluence with Lake Champlain	855	22,400	30,200	34,000	43,800

Unlike free-flowing flooding, flooding due to ice jams is based only on winter discharges. Hence, two separate hydrologic analyses were performed, one for free-flowing floods and one for ice jam events.

The discharge-frequency relationship for ice jam events is based on 45 years of winter peak discharges during the potential ice jam season (December 1 - March 31) at the USGS gage near East Berkshire, Vermont. The observed winter flow data were fit to a log-Pearson Type III distribution. The discharge-frequency relationship for winter flows in Swanton was developed using the following equation:

$$Q_1/Q_2 = (A_1/A_2)^n$$

A summary of peak discharges for ice jam floods on the Missisquoi River is shown in Table 2, "Summary of Ice Jam Discharges".

TABLE 2 - SUMMARY OF ICE JAM DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
MISSIQUOI RIVER					
At the confluence with Lake Champlain	855	12,921	16,362	17,493	19,571

Hydrologic analyses for Lake Champlain were based on data obtained from the Flood Insurance Study for the City of Plattsburg, New York, and a technical report of Lake Champlain and the upper Richelieu River prepared by the International Champlain-Richelieu Board (References 5 and 6). Data used in this study were obtained from the gaging stations at Rouses Point, New York (1871 to present), and Burlington, Vermont (1939 to present).

A summary of peak elevation-frequency relationships of Lake Champlain is shown in Table 3, "Summary of Elevations".

TABLE 3 - SUMMARY OF ELEVATIONS

FLOODING SOURCE AND LOCATION	ELEVATION (feet) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
LAKE CHAMPLAIN				
Entire shoreline within the Town of Swanton	101.0	101.8	102.0	102.3

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding sources studied in detail were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of these flooding sources.

Water-surface elevations of floods of the selected recurrence intervals were computed through the use of the U. S. Army Corps of Engineers (COE) HEC-2 step-backwater computer program (Reference 7). Starting water-surface elevations for the 10- and 50-year floods on the Missisquoi River were obtained from the Flood Insurance Study for the City of Plattsburg (Reference 5). Starting water-surface elevations for the 100- and 500-year floods on the Missisquoi River were determined using the slope/area method.

Cross-section data were obtained by field measurement. All bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry in order to compute the significant backwater effects of these structures.

Roughness coefficients (Manning's "n") used in the hydraulic computations were assigned on the basis of field inspection and were compared to values in published reports for reasonableness (References 8 and 9). The channel "n" values for the Missisquoi River ranged from 0.025 to 0.085, and the overbank "n" values ranged from 0.025 to 0.150.

Flooding due to ice jams is a different hydraulic phenomenon from free-flowing floods. Hence, two separate hydraulic analyses were performed, one for free-flowing floods and one for ice jams.

For ice jam floods, water-surface elevations of floods of the selected recurrence intervals were computed through the use of the COE HEC-2 step-backwater program modified to simulate both ice jam and free-flowing floods (Reference 10). The HEC-2 program was utilized to generate stage-frequency relationships for ice jam floods and free-flowing floods at each surveyed cross section. The resulting stage-frequency relationships were verified by comparison with field surveyed high-water data obtained from local residents along the study reach. Starting water-surface elevations for the ice jams were based on the results of ice cover computations and an extensive field reconnaissance effort.

A comparison of the resulting stage-frequency relationships for ice jams and free-flowing floods indicate that ice jams predominate from the Missisquoi National Wildlife Refuge to the Swanton Village Dam and from the U. S. Route 7 bridge to the upstream corporate limits. Using the laws of probability, the stage-frequency distribution of ice jams and free-flowing floods were combined. As expected, where ice jams predominate, the ice jam stage-frequency distribution approximates the combined or total stage-frequency distribution. Similarly, where free-flowing floods predominate, the free-flowing stage-frequency distribution approximates the combined or total stage-frequency distribution.

Simulation of the flood elevations induced by ice jams required assumptions regarding the thickness and roughness of the ice cover. Ice thickness was assumed to be 2 feet and the Manning's "n" value for the underside of the ice cover was assumed to be 0.057.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals. Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway is computed (Section 4.2), selected cross-section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 3).

All elevations used in this study are referenced to the National Geodetic Vertical Datum of 1929 (NGVD), formerly referred to as Sea Level Datum of 1929. Locations of the elevation reference marks used in the study are shown on the maps.

With the exception of ice jams, the hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are valid only if hydraulic structures remain unobstructed, and dams and other flood control structures operate properly and do not fail.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FEMA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For the Missisquoi River, the boundaries of the 100- and 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24,000 enlarged to a scale of 1:3,000 with a contour interval of 10 feet (Reference 11). The 100- and 500-year flood boundaries for Lake Champlain were delineated using topographic maps at a scale of 1:24,000 enlarged to a scale of 1:9,600 with a contour interval of 10 feet (Reference 11). In cases where the 100- and 500-year flood boundaries are close together, only the 100-year boundary has been shown.

For the areas studied by approximate methods, the boundary of the 100-year flood was delineated using the Flood Hazard Boundary Map for the Town of Swanton (Reference 12).

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 3). Small areas within the flood boundaries may lie above the flood elevations and, therefore, may not be subject to flooding. Owing to limitations of the map scale and lack of detailed topographic data, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood can be carried without substantial increases in flood heights. Minimum standards of the

FEMA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodway in this report is presented to local agencies as a minimum standard that can be adopted or that can be used as a basis for additional studies.

The floodway presented in this study was computed on the basis of equal conveyance reduction from each side of the flood plains. The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 4).

As shown on the Flood Boundary and Floodway Map (Exhibit 3), the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown. Portions of the floodway widths of the Missisquoi River extend beyond the corporate limits.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 6.

Near the mouth of the stream studied by detailed methods, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "With Floodway" elevations presented in Table 4 for certain downstream cross sections of the Missisquoi River are lower than the regulatory flood elevations in that area, which must take into account ice jam affects.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FEMA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for each flooding source affecting the Town and Village of Swanton.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY	INCREASE
Missisquoi River								
A	35,410	372	4,773	7.1	109.1	106.1[3]	106.7	0.6
B	36,900	461[2]	6,822	5.0	110.0	107.5[3]	107.5	0.0
C	40,595	321	4,487	7.6	111.9	109.5[3]	109.7	0.2
D	40,845	393	3,604	9.4	112.3	109.7[3]	109.9	0.2
E	41,054	345	4,251	8.0	112.7	110.6[3]	111.5	0.9
F	41,314	429	7,037	4.8	118.4	118.4	119.4	1.0
G	42,214	400[2]	7,462	4.6	118.7	118.7	119.7	1.0
H	42,958	384	7,385	4.6	118.9	118.9	119.8	0.9
I	45,778	495	8,454	4.0	119.3	119.3	120.2	0.9
J	48,023	391	7,238	4.7	119.7	119.7	120.6	0.9
K	51,268	511	7,870	4.3	120.2	120.2	121.1	0.9
L	53,238	361	6,172	5.5	120.5	120.5	121.3	0.8
M	53,593	338	5,645	6.0	120.8	120.8	121.7	0.9
N	56,383	1,140	13,416	2.5	121.6	121.5[3]	122.4	0.9
O	56,893	1,340	18,965	1.8	122.8	121.8[3]	122.7	0.9
P	58,138	1,765	18,294	1.9	122.8	121.9[3]	122.8	0.9

[1]Feet above confluence with Lake Champlain

[2]This width extends beyond corporate limits

[3]Elevation computed without consideration of ice jam effects

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN AND VILLAGE OF SWANTON, VT

(FRANKLIN CO.)

FLOODWAY DATA

MISSISQUOI RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Missisquoi River (continued)								
Q	58,640	1,349	14,126	2.4	122.9	122.1[2]	123.0	0.9
R	62,205	884	11,905	2.9	123.4	122.4[2]	123.3	0.9
S	64,325	1,750	18,505	1.8	123.6	122.6[2]	123.6	1.0

[1]Feet above confluence with Lake Champlain

[2]Elevation computed without consideration of ice jam effects

TABLE 4

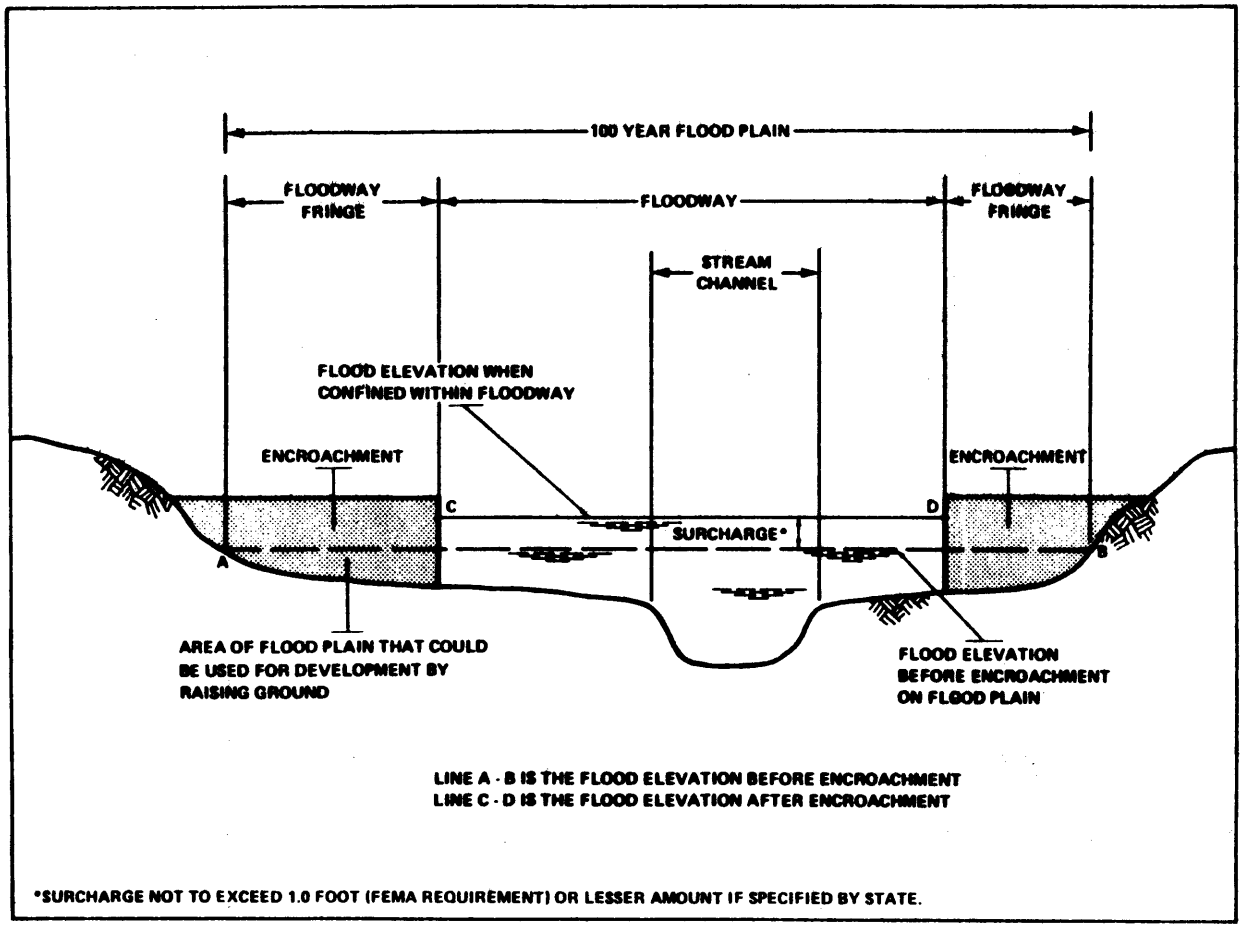
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN AND VILLAGE OF SWANTON, VT

(FRANKLIN CO.)

FLOODWAY DATA

MISSISQUOI RIVER



FLOODWAY SCHEMATIC Figure 6

have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the flooding sources of the Town and Village of Swanton are shown on the Flood Profiles (Exhibit 1) and are summarized in the Flood Insurance Zone Data Table (Table 5).

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Missisquoi River Reach 1	01*07** 08**	-2.2	-0.6	+1.2	020	A4	Varies
Lake Champlain Reach 1	04**06** 07**11** 12**	-0.8	-0.1	+0.3	010	A2	102

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

*Village of Swanton
**Town of Swanton

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN AND VILLAGE OF SWANTON, VT

(FRANKLIN CO.)

FLOOD INSURANCE ZONE DATA

MISSISQUOI RIVER AND LAKE CHAMPLAIN

In lacustrine areas, reaches are limited to the distance for which the difference between the 10- and 100-year flood elevations does not vary more than 1.0 foot. Using these criteria, the Town of Swanton shoreline qualifies as one reach whose flooding source is Lake Champlain. The locations of these reaches are shown on the Flood Insurance Rate Map.

5.2 Flood Hazard Factors

The FHF is the FEMA device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest 0.5 foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of the Town and Village of Swanton was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.
Zones A2 and A4:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHF.
Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; also, areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 5, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for the flooding sources studied in detail in the Town and Village of Swanton.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Town and Village of Swanton is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FEMA.

6.0 OTHER STUDIES

In 1930, the COE submitted to the U. S. House of Representatives a report on the Missisquoi River drainage basin, discussing notable historic floods and basin characteristics (Reference 1).

Flood Insurance Studies for the Towns of Highgate and Sheldon are currently being prepared (References 13 and 14). The results of those studies will be in exact agreement with the results of this study. In addition, Flood Plain Information reports are available from the COE for the Towns of Sheldon, Highgate, and Swanton (References 15 and 16).

This study is authoritative for purposes of the Flood Insurance Program, and the data presented here either supersede or are compatible with previous determinations.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the office of the Insurance and Mitigation Division of the Federal Emergency Management Agency, Regional Director, Region I Office, J. W. McCormack Post Office and Courthouse Building, Room 462, Boston, Massachusetts 02109.

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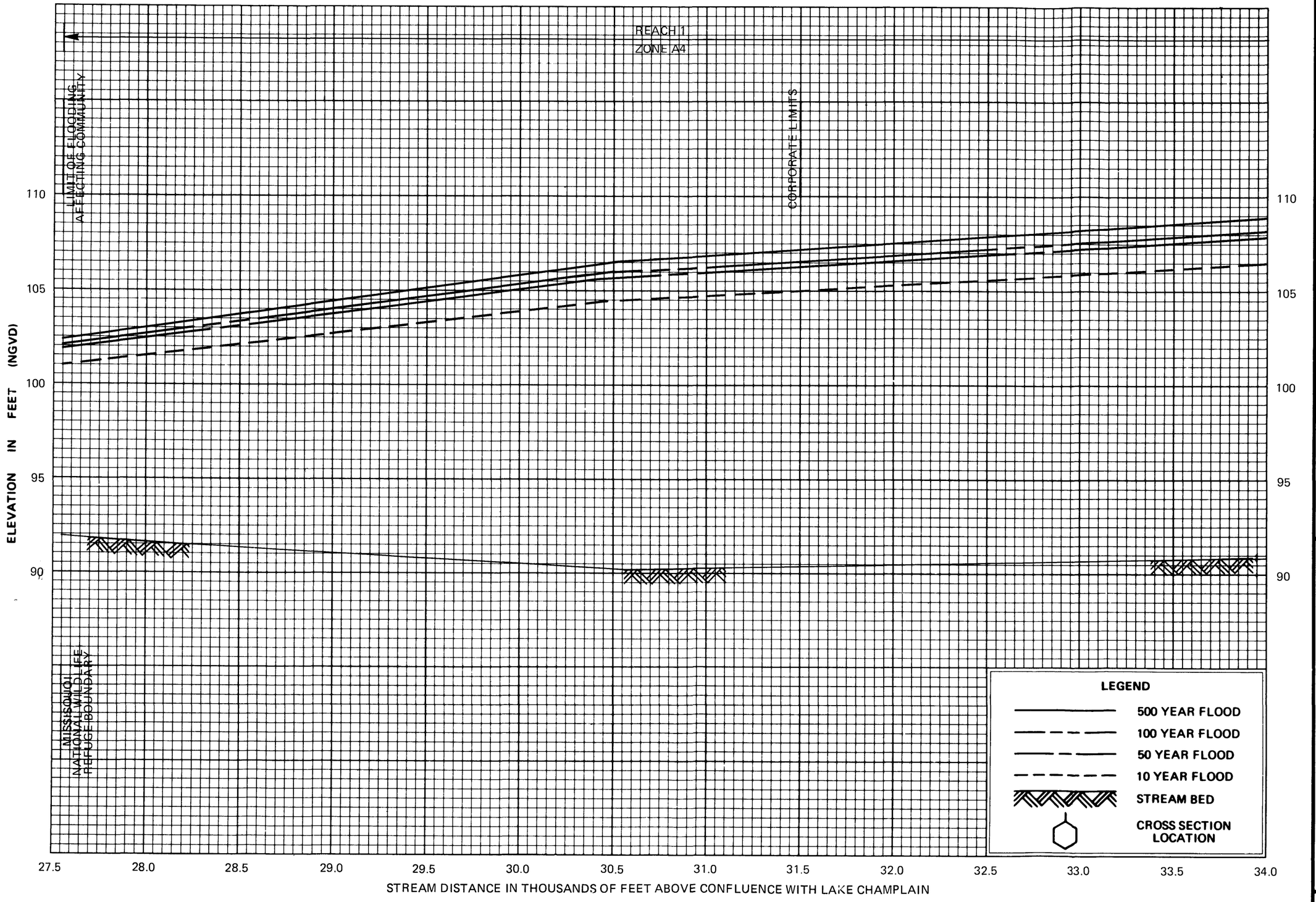


FLOOD PROFILES

MISSISQUOI RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN AND VILLAGE OF SWANTON, VT

(FRANKLIN CO.)

01P

REACH 1
ZONE A4

VILLAGE OF SWANTON

CORPORATE LIMITS EXTENDED

CORPORATE LIMITS

ELEVATION IN FEET (NGVD)

115
110
105
100
95
90
85

A
B

34.0 34.5 35.0 35.5 36.0 36.5 37.0 37.5 38.0 38.5 39.0 39.5 40.0 40.5

STREAM DISTANCE IN THOUSANDS OF FEET ABOVE CONFLUENCE WITH LAKE CHAMPLAIN

LEGEND

- 500 YEAR FLOOD
- 100 YEAR FLOOD
- 50 YEAR FLOOD
- 10 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

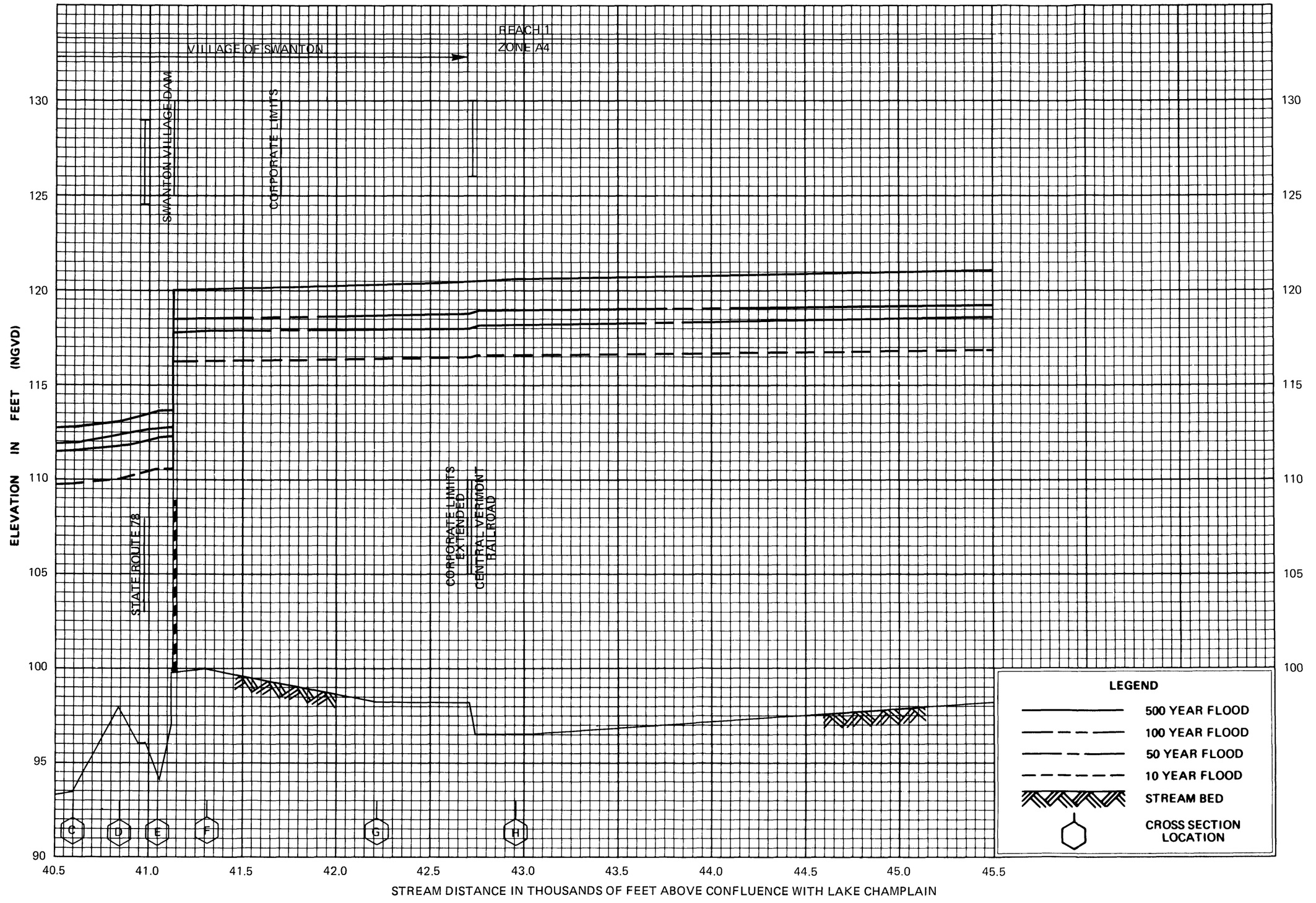
FLOOD PROFILES

MISSISQUOI RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN AND VILLAGE OF SWANTON, VT
(FRANKLIN CO.)

02P



FLOOD PROFILES

MISSISQUOI RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

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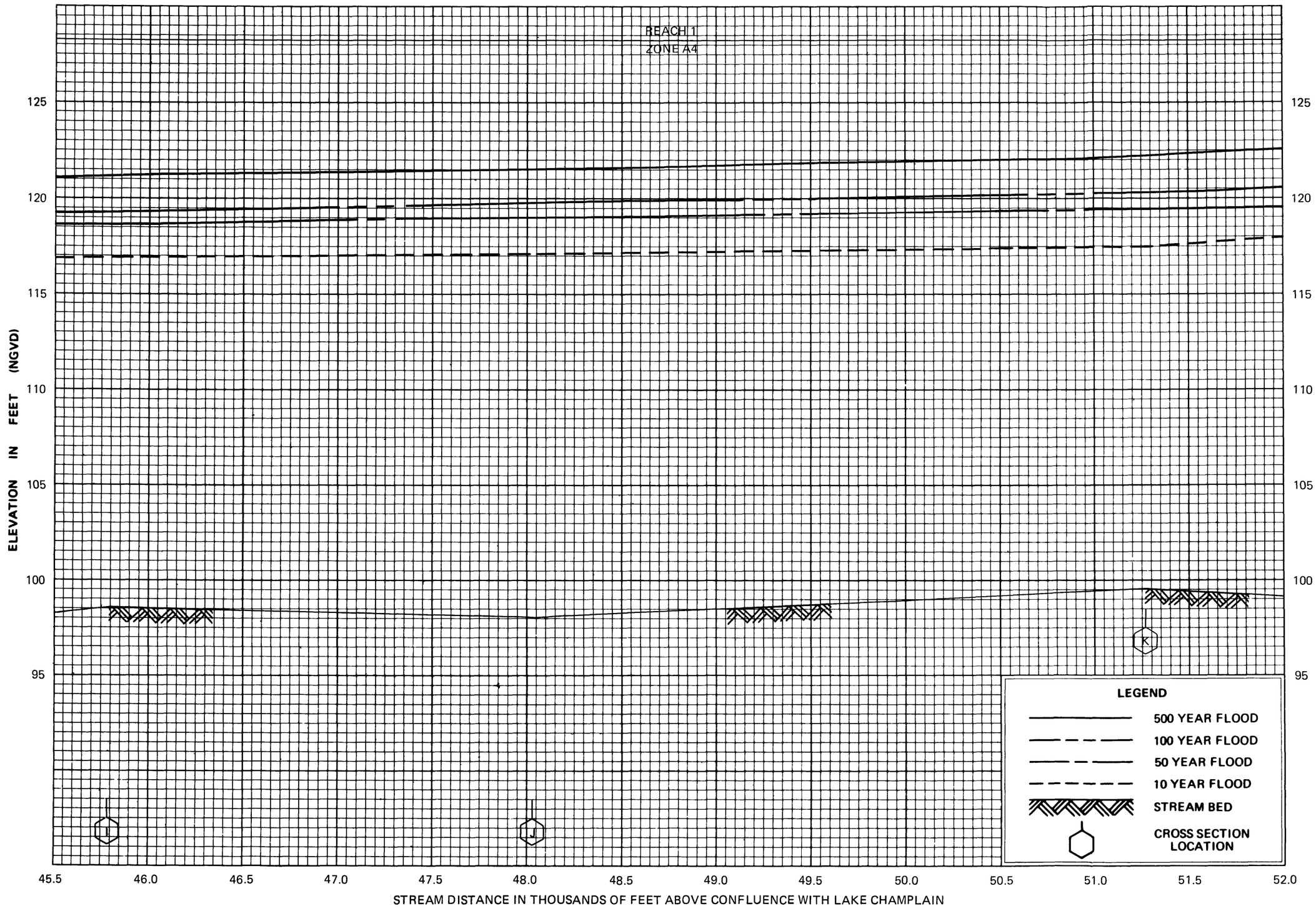
03P



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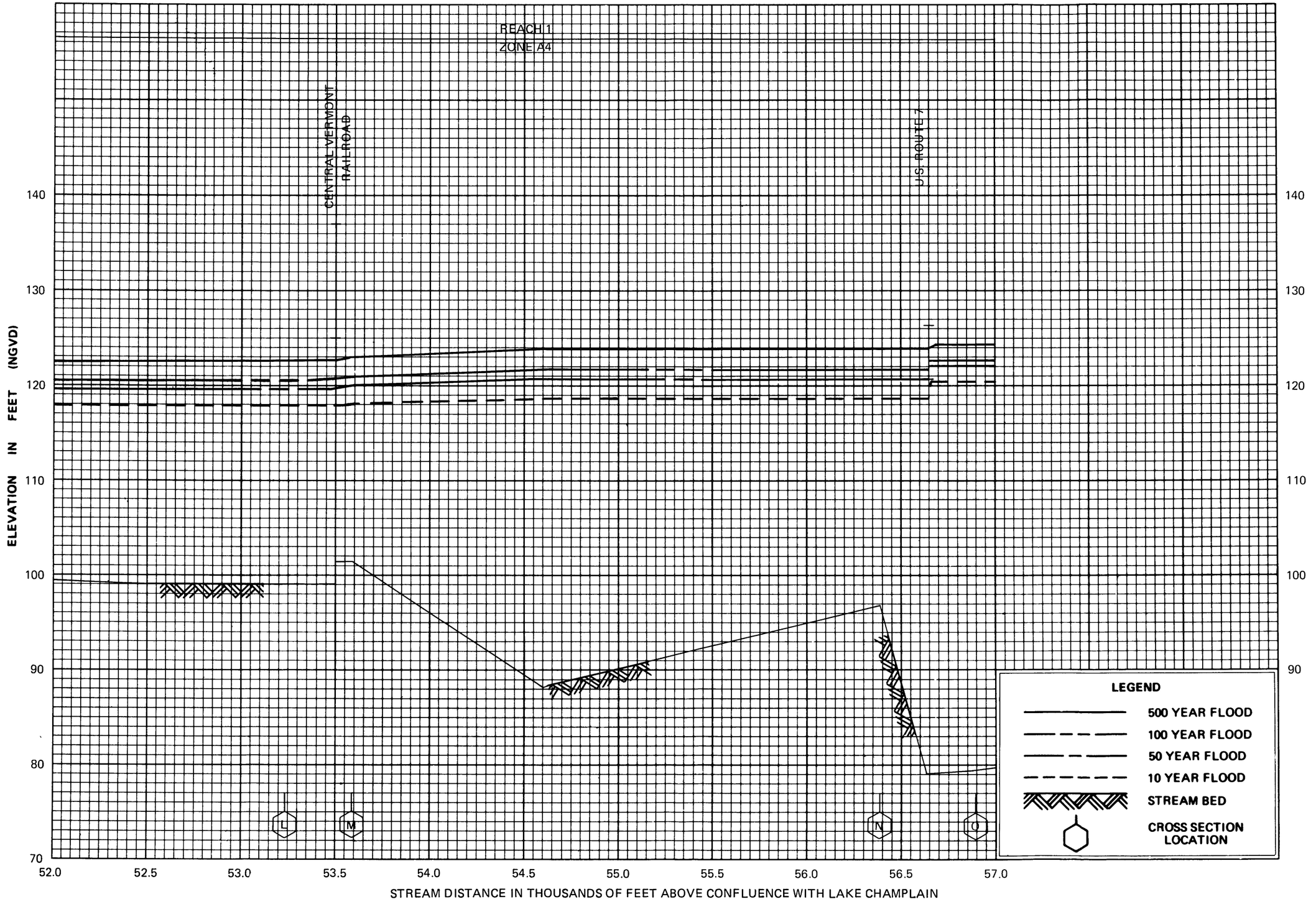

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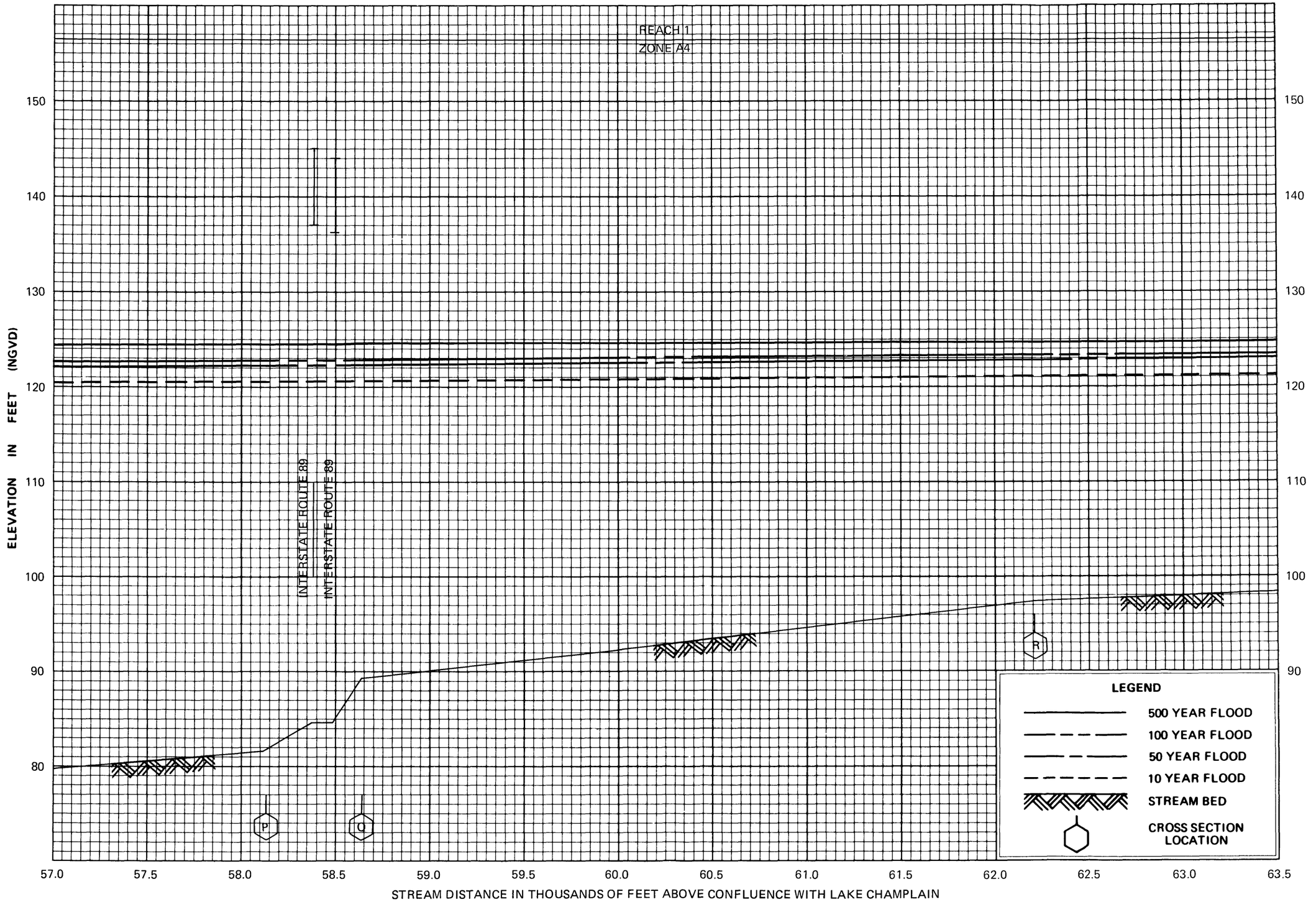

FLOOD PROFILES

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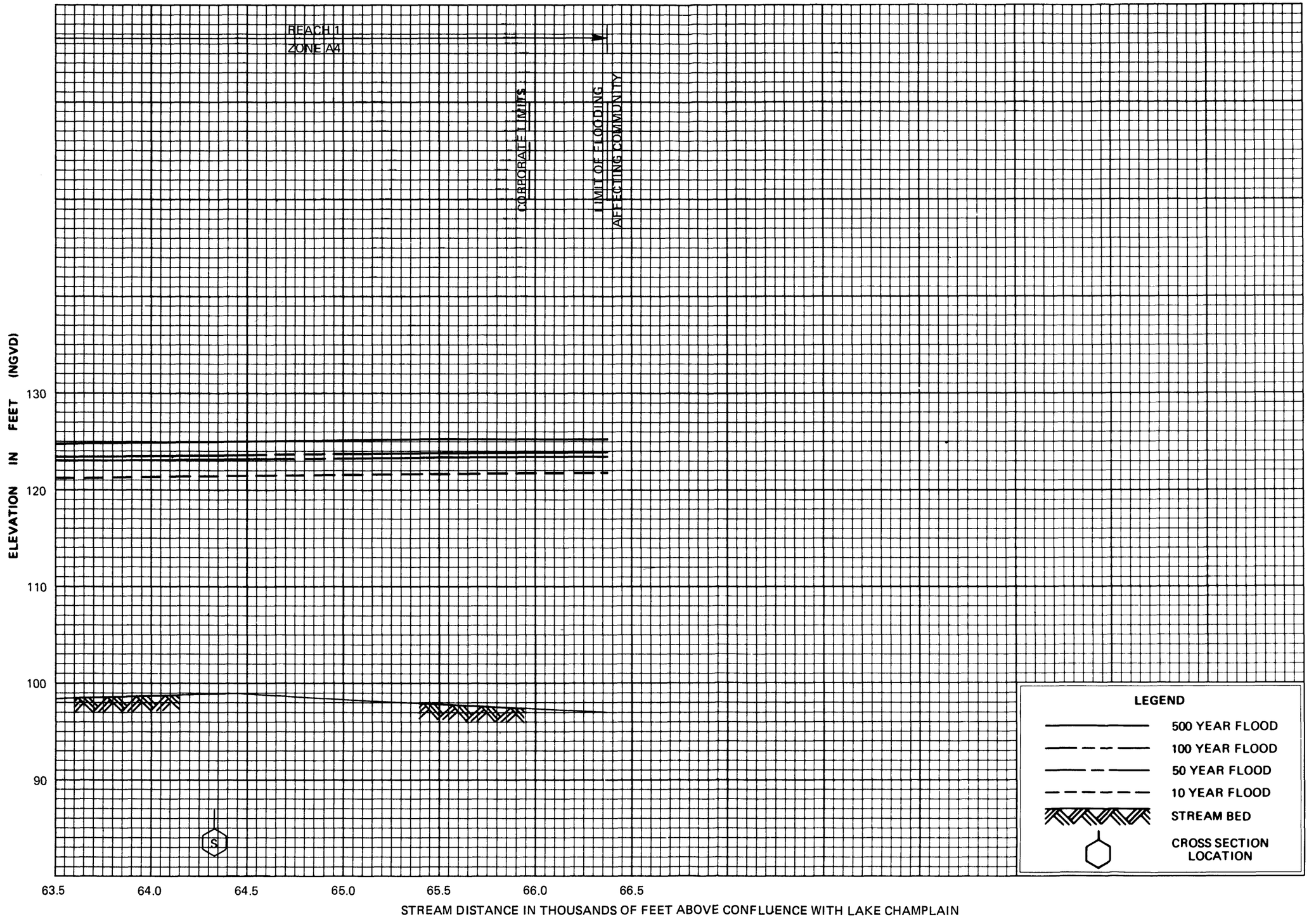

FLOOD PROFILES

MISSISQUOI RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN AND VILLAGE OF SWANTON, VT
(FRANKLIN CO.)

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